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December 13, 1958

VOL. 74 NO. 24

PAGES 369-384

SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Pinwheel 'Chute

See page 381

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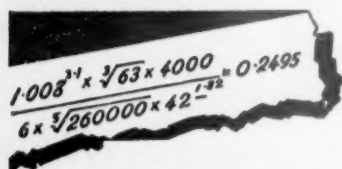
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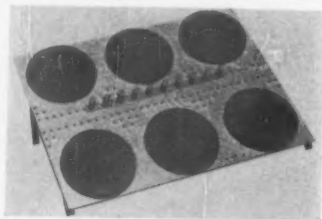
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ASTRONOMY

Find New Cause of Aurora

Leaks in the radiation belt that encircles the earth may cause the northern and southern auroral lights. Energized particles spray radiation where auroras occur.

► **LEAKS IN** the newly discovered radiation belt encircling the earth may be responsible for the flickering northern and southern auroral lights.

Energized particles in the belt, believed to consist mostly of electrons and protons, collide with constituents of the upper atmosphere and spray radiation into the lower reaches where the auroras occur.

Dr. James A. Van Allen, head of the physics department, Iowa State University, proposed the "leaky bucket" theory during a detailed report on data gathered by the Explorer IV satellite given at the American Physical Society meeting in Chicago.

Although his report is the most comprehensive yet given on Explorer IV, Dr. Van Allen said that only a small number of the some 3,600 "passes" through the belt have been analyzed. Data collected by the satellite are transmitted to tape recorders on the ground.

The Iowa physicist, a member of the technical panel of the earth satellite program of the U.S. National Committee for the International Geophysical Year, said the discovery of the radiation belt by earlier satellites this year has been "confirmed and greatly extended" by Explorer IV reports.

The Explorer IV space reports did not, however, answer all the questions on the

radiation belt, such as its origin, spectrum and all the types of radiation.

A feature of the Explorer IV observations was the apparent variability of the composition of the belt's trapped radiation. It would be unwise to attempt a definite statement on the belt's composition, but it is "reasonable" to suppose it is made up principally of electrons and protons, he said.

Various types of detectors aboard Explorer IV, which was launched July 26, found low energy, or "soft" radiation, but in addition, there appears to be a component "considerably more penetrating" than is usually observed at low altitudes in the auroral zone, he said.

Dr. Van Allen said he was not able to offer an appraisal of whether this more penetrating component consists of protons, of electrons or of X-rays, which result from electrons striking the satellite's metal skin and producing a radiation more penetrating than the parent electrons. If such action is the case, it could falsely extend the apparent particle spectrum.

"It appears likely that many important geophysical phenomena are intimately related to the reservoir of charged particles found to be trapped in the outer reaches of the earth's magnetic field," Dr. Van Allen said.

There is a systematic drift of the trapped

particles in the belt, he explained, as the electrons move east and the protons west, both "corkscrewing" back and forth from the Northern to Southern hemisphere.

The main loss of electrons from the belt is caused by atmospheric scattering, and most protons are lost by their collisions with atmospheric constituents, Dr. Van Allen said. But there is also a leakage of the "soft radiation" into the auroral zone.

Dr. Van Allen suggested that this "leaky bucket" is the direct cause of the northern and southern lights. A steady leakage of energetic particles may also contribute to the general heating of the atmosphere at all latitudes, he said.

He believes that the plasma surrounding the sun occasionally replenishes this reservoir with particles that work their way into the outer reaches of the earth's magnetic field and then are trapped.

It appears that radiation leakage from the reservoir is favored at the higher latitudes, producing "outward projecting horns" of constant radiation intensity.

The radiation belt may well be the seat of a distributed "ring" of electrical current encircling the earth and disturbances of the belt, due to the arrival of solar plasma, may be directly responsible for magnetic storms, Dr. Van Allen said.

Science News Letter, December 13, 1958

ROCKETS AND MISSILES

'Project Discoverer' Aims At Satellite Probes

► **THE DEFENSE** Department has announced a new long-range satellite program that may eventually succeed in putting into orbit a man-made moon weighing 10,000 pounds. The immediate objective is the launching of a 1,300-pound satellite.

Labelled "Project Discoverer," it will be carried out by the Air Force under the direction of the Advanced Research Projects Agency.

The project will extend over an indefinite period and will involve at least a dozen launching attempts, according to ARPA's director, Roy W. Johnson. Its purpose is to test various aspects of satellite hardware, re-entry and, ultimately, recovery.

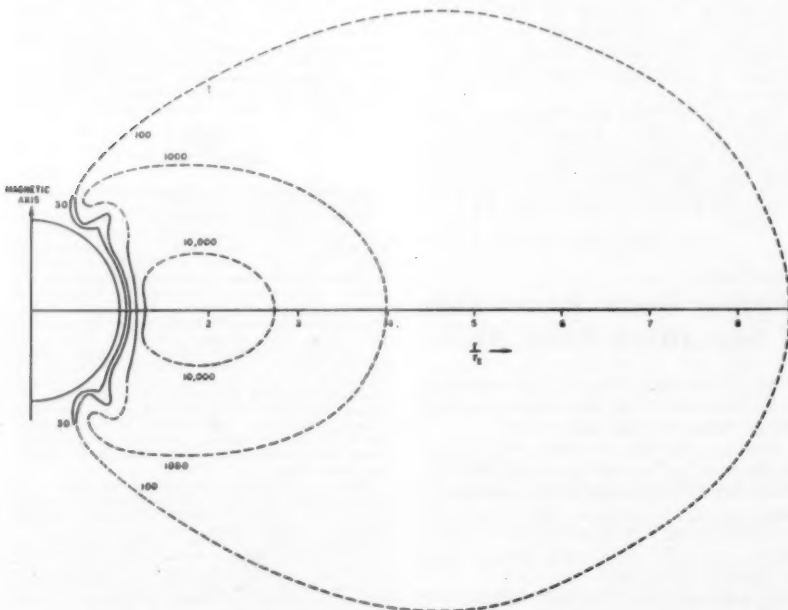
Launchings, aimed toward the South Pole, will be from Vandenberg Air Force Base, California.

The vehicle for the first launching, expected to be made late this year or early next year, will be a Thor IRBM with a special new second-stage vehicle having Bell-Hustler engines.

The first launching will be primarily to test the vehicle itself, especially its guidance and propulsion. The initial recovery attempt will probably be made sometime in early 1959.

Mr. Johnson disclosed that mice will certainly be included in some of the satellites and that a primate may be used in one of them. He did not specify which primate was being considered but said it was definitely not man. However, he said, ARPA is working with the National Aeronautics and Space Administration on a program which has as its sole purpose to put a man into orbit and return him safely.

Science News Letter, December 13, 1958



RADIATION BELT—Solid lines indicate contours of constant radiation intensity; dashed lines are a speculative extension, tentatively confirmed by Pioneer. The numbers specify the radiation intensities.

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PHYSICS

Princeton's Wigner Gets Third Enrico Fermi Award

► **THE ATOMIC Energy Commission's** third Enrico Fermi Award has been presented to Dr. Eugene P. Wigner of Princeton University.

The award ceremony was held on Dec. 2, the 16th anniversary of the startup of the first atomic reactor by Fermi and his associates at Stagg Field in Chicago. Dr. Wigner was one of Fermi's co-workers at that time.

Professor of mathematical physics at Princeton, Dr. Wigner received the award, consisting of a medal, a citation and \$50,000, for his contributions to the development of nuclear reactors and to the training of scientists and engineers in the field. The award was recommended by the AEC's General Advisory Committee and approved by President Eisenhower.

Dr. Wigner was the first to calculate the correct lattice proportions of uranium and graphite in the design of the Hanford production reactors, according to the committee's recommendation letter.

"There is no one in the country today who is better informed about the reactor development program and has made more contributions to its progress than has Dr. Wigner."

"It is especially appropriate," the citation reads, "to emphasize that although Dr. Wigner is rightfully regarded as a theoretical physicist, his contributions have been outstanding in the practical developments of nuclear energy. In this respect his dual role in the atomic energy field is quite unique."

The adoption of the water-cooled design for the Hanford piles was made largely through Dr. Wigner's efforts. This decision is believed to have been of the "greatest importance" in insuring the necessary production of plutonium during the war and afterwards.

The late Dr. John von Neumann, noted scientist and AEC member, and the late Dr. E. O. Lawrence, inventor of the cyclotron, were the recipients of the first two Fermi Awards. (See SNL, Dec. 14, 1957, p. 376.)

Science News Letter, December 13, 1958

PSYCHOLOGY

Mother Goats Reject Kids If Separated After Birth

► **MOTHER GOATS** that are separated from their babies for one hour after birth do not want the kids back.

Furthermore, this short separation results in abnormal or unstable maternal behavior, Dr. Julius B. Richmond and Leonard Hersher, college of medicine, State University of New York, Syracuse, and A. Ulric Moore of Cornell University, Ithaca, report in *Science* (Nov. 28).

In addition, the abnormal behavior of these mothers affected the maternal behavior of mothers that had not been separated from their kids.

The separated mothers were more willing

to nurse offspring that did not belong to them. They nursed their own kids less and other kids more than did the nonseparated mothers. Mothers that had not been separated from their kids nursed other kids relatively little, devoting most of their time to their own offspring.

An unexpected result of the study that included 24 separated and 21 nonseparated mother goats was the rejection of their own kids by some of the mothers that were not separated from their young, the scientists comment.

They postulate that the rejection behavior may have developed in the nonseparated mothers because their kids wandered off to some of the separated mothers shortly after birth.

Science News Letter, December 13, 1958

SCIENCE NEWS LETTER

VOL. 74 DECEMBER 13, 1958 NO. 24

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N.W., Washington 6, D. C., NORTH 7-2255. Cable Address: SCIENSERVC.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U.S.A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1897. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40 P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283) authorized February 28, 1950. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.

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ENGINEERING

Fuel Generates Electricity

► **INCREASED RESEARCH** on an electrochemical device for the generation of electricity directly from burning fuel is needed.

When developed beyond the present laboratory stage, the device, known as a fuel cell, could eliminate the need for furnaces, boilers, steam lines, turbines and generators.

Everett Gorin and Howard L. Recht of the Consolidation Coal Company of Liberty, Pa., described their work on fuel cells at the American Society of Mechanical Engineers meeting in New York. They said that, although there has been sporadic research on fuel cells for almost a century, there has not been a decided awakening of interest before recent years, and that new cells are beginning to meet the demands of steady output.

Mr. Gorin described his fuel cell as an electrochemical device similar to a storage battery, which operates by feeding a fuel continuously through the cell along with an oxidizing agent. A gaseous fuel, such as hydrogen or carbon monoxide, is used. Ultimately, the authors said, such gases could be produced from the world's abundant supply of coal.

The combustion of fuel in the cell is carried out in such a manner that electric-

ity is generated rather than heat. This is done by having two electrodes, a fuel electrode and an air electrode. The two gases contact these electrodes but do not mix with one another. They are separated by a diaphragm that serves two purposes. It prevents the ordinary combustion reaction when two gases mix, and acts as an electrolyte, conducting the current and completing the electrical circuit.

The fuel cell differs from an ordinary storage battery, said Mr. Gorin, in that it does not run down like a battery. It operates continuously as long as it is supplied with a fuel and an oxidizer.

To compete economically with existing power generating systems, fuel cells would have to be reasonably small, cheap to build, long lasting and efficient fuel burners. If such fuel cells could be developed, said the authors, they would permit coal to be competitive with nuclear power, as far as fuel cost is concerned, for a much longer period than would be the case for a conventional steam plant.

The work described by the authors was carried out under the sponsorship of the U.S. Army Signal Corps.

Science News Letter, December 13, 1958

ANTHROPOLOGY

Trace Early Man

► **A GEOLOGICAL** period that brought with it intense cold was of great importance to the history of mankind, Dr. Ralph S. Solecki, Smithsonian Institution, told the American Anthropological Association meeting in Washington.

This period, known to scientists as Würm III, sent the people of Europe fleeing for their lives from the bitter, killing cold. It lasted from about 25,000 years ago to 11,500 years ago. It was one of the coldest times in the Pleistocene.

Central Europe, Dr. Solecki told his colleagues, was pinched between the mountain glacier of the Alps and the Scandinavian ice shield, allowing only a narrow though apparently still passable ice-free corridor between.

During this period, too, the locking up of the sea water in the glaciers caused the shallow sea between Alaska and Siberia to be laid bare, allowing animals and man to cross into the New World.

Shanidar Cave in Iraq, which has given us such a comprehensive picture of the prehistoric life of early man, was occupied for at least 100,000 years and is still a human home today.

But in that cave, as in other important caves of the Near East, no trace of human occupancy was found that can be dated for the period between 25,000 and 13,000 years ago. Shanidar Cave, Dr. Solecki explained, lies at 2,500 feet altitude on a steep mountain face.

Since the glaciers during the Würm max-

imum reached to about 4,500 feet, presumably the cave was not habitable by men during that time.

People living in the New Stone Age village of Zawi Chemi in what is now Iraq, like wealthy people today, may have had a winter residence and a summer home, Mrs. Rose Lilien (Mrs. Ralph Solecki) told the same meeting.

These people were among the first to emerge from their cave dwellings to live in the open air. They probably occupied their village homes in Zawi Chemi in the spring, summer and fall and went back to their refuge in Shanidar Cave in winter.

Although we cannot be sure that these villagers had a real agriculture, plant food must have been a major item of their diet. This is shown by the large number of milling tools they left behind them. No sickle blades were found, but the very abundant spall choppers were found to cut grass very efficiently.

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CHEMISTRY

Swedish Chemist Receives Atoms for Peace Award

► **A FAILURE** in a laboratory project started chemist George Charles de Hevesy off on research that resulted in his being named winner of the second Atoms for Peace Award.

More than 40 years ago, Prof. de Hevesy,

a staff member at the Research Institute for Organic Chemistry, University of Stockholm, Sweden, failed in his attempts to separate "Radium D" from lead. This resulted in his development of the use of the radioactive element, now known to be an isotope of lead and not readily separable from it by chemical means, as a tracer for studying chemical processes involving lead. Since then the chemist has pioneered in the use of radioactive tracer techniques in chemistry, biology and medicine.

In announcing the award, Dr. Detlev W. Bronk, president of the Rockefeller Institute and of the National Academy of Sciences, pointed out that Prof. de Hevesy "was the first to apply both natural and artificial isotopes to the study of plants and animals; he introduced the use of stable isotopes and he was the first to explore the possibility of creating radioactive substances within the system being studied by means of neutron bombardment."

"These discoveries, now adopted in laboratories and hospitals all over the world, are certainly among the most important advances in the peaceful use of atomic energy in our time."

Prof. de Hevesy, who was awarded the Nobel Prize in Chemistry in 1943, will come to the United States in January, 1959, to receive a gold medallion and the \$75,000 prize money. He was selected unanimously by the awards committee from a list of 111 nominees representing 19 countries throughout the world.

Created as a memorial to Henry Ford and his son Edsel, the award was established in response to President Eisenhower's 1955 Geneva appeal for international efforts to develop nuclear energy for peaceful purposes.

The first award was presented to Dr. Niels Bohr in 1957.

Science News Letter, December 13, 1958



AWARD WINNER—Prof. George Charles de Hevesy received second Atoms for Peace Award.

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GENERAL SCIENCE

Christmas Stocking Science

Since young might-be scientists especially enjoy do-it-themselves Christmas gifts, sources of basic materials and information are suggested.

► REMEMBER HOW it was on Christmas morning when you had opened all the packages?

How you sorted out the gifts that were for wearing, or saving for another season, or just for looking at, and piled them back under the tree? Then, a special part of Christmas began as you settled down to savor the gifts you could do something with!

Realizing that Space Age children are just like us in that respect, only much more so, you may wonder whether anything less than a crate of satellite parts or the essential materials for an atomic reactor will thrill them this Christmas. What can a parent or a fond relative buy to make a hopeful young scientist happy? If you should happen to get an inspired idea, where are these fairly unusual items to be found?

Since SCIENCE SERVICE searches for just such materials the year around, the files are full of ideas for stuffing "scientific" Christmas stockings. Here, then, are some suggestions that will serve as a basis for your own ideas. Most of these items are very inexpensive and all of them will offer youngsters a chance to use some ingenuity and ability.

You may want to encourage your young scientist in his current interest in rocks or chemistry or stars or biophysics. On the other hand, this may be just the right time to introduce her or him to the adventure of exploring a brand new field.

Science Clubs of America, a SCIENCE SERVICE activity, has studied the sources of interest and ideas of the outstanding teen-aged scientists who are winners in the Science Talent Search for the Westinghouse Science Scholarships and Awards or are finalists in the National Science Fair, both administered by SCIENCE SERVICE. Of the 1958 finalists, 38% said that their ideas for these top level science projects were stimulated by scientific books, magazines and journals. Apparently, then, a well chosen gift of this kind is very sure to be welcomed.

General scientific magazines most often mentioned by students include such publications as *Science News Letter*, *Science*, *Scientific American* and similar magazines.

Journals in specialized fields often are published by scientific societies. For instance, the *Journal of the Audio Engineering Society*, Box 12, Old Chelsea Station, New York 11, N. Y., comes with membership (\$3.00 for students); *Skylights*, aviation facts, news stories, history, careers, etc., (free from National Aviation Education Council, 1025 Connecticut Ave., N.W., Washington 6, D. C.); *Pennsylvania Archeologist*, quarterly, (junior membership \$1.00,

from Society for Pennsylvania Archeology, Pennsylvania State Museum, Harrisburg, Pa.); *Space Science*, monthly bulletin, 75¢ a year or 50¢ for group subscriptions of five or more, from Astronomical League, 4211 Colie Dr., Silver Spring, Md.). Your public library will have reference lists of dozens of professional societies, many of which have junior memberships available.

As for books to stimulate and challenge your pre-scientist, such an embarrassment of riches exists at the present time that it would be difficult to choose a few to mention even as examples. However, since not all the colorful books in the stores are equally accurate, valuable and well written, you may want the expert guidance of such publications as those of the American Association for the Advancement of Science, 1515 Massachusetts Ave., N.W., Washington 5, D. C. These include An Inexpensive Science Library, listing paperbound science and mathematics books for high school students (25¢) and The Traveling High School Science Library, an annotated catalogue of 200 science and mathematics books (25¢). Many publishers of paper-bound and hard-cover science books offer free information and price lists of their books. Your librarian will be glad to give you her professional advice in choosing from such lists in her files.

For the Air-Minded: Capital Airlines, Inc., Washington 1, D. C., has a free booklet, "Tinkering with the Turbine," which describes the principles of jet-prop airplane engine operation. National Aviation Education Council, 1025 Connecticut Ave., N.W., Washington 6, D. C., offers such materials as "Jets," how they are built and operated (50¢); "Space Frontier," space facts and exploration, charts and photographs (25¢); "Helicopters," (50¢).

Wright-Patterson Air Force Base, Ohio, has free leaflets available on such subjects as "Opportunities for You in the New Age of Space".

The Civil Aeronautics Administration, Washington 25, D. C., has such interesting material as "Pilot's Weather Handbook" (\$1.50), "Path of Flight" (65¢) and "Terrain Flying" (30¢).

The Smithsonian Institution, Washington 25, D. C., offers a well-illustrated 166-pp. book, "The National Aeronautical Collections" (\$1.50).

The younger ones on your list will like the safe rocket that is propelled over 100 feet by a stream of water (\$2) and plastic space ship model kits (\$1 each) from Science Materials Center, 59 Fourth Ave., New York 3, N. Y.

For Atomic Researchers: The Atomic Energy Commission, Washington 25, D. C.,

(Continued on page 382)

PHYSICS

Propose Theory of Liquids

The fluidity of liquids can be understood, a crystallographer believes, in terms of the packing of irregular polyhedra and not as an imperfect gas or solid.

► WHY A SOLID is a solid, and a gas is a gas is known. There are theories that account for them. In solids, the molecules are packed regularly; in gases, they move freely at random.

However, there is no satisfactory theory in terms of molecular structure which can explain why a liquid is a liquid.

Previous approaches have either treated a liquid as a solid with imperfections, or as a gas which is crowded. Few have attempted to treat a liquid as a unique structure.

Now, Prof. J. D. Bernal, crystallographer and head of the physics department at Birkbeck College, University of London, has developed a theory stating that the secret of the structure of liquids is organized irregularity. The molecules are coherently packed, but without any regularity.

The great problem has been to demonstrate this in a physical model, and to explain this model in mathematical terms.

He has attempted to construct by hand, using table tennis balls or plasticine, a physical model of organized irregularity.

He has also had to develop his own statistical geometry to make this mathematical model. Mathematicians have been unable to provide him with any short-cut formulae.

What he has done now is to examine more closely the "neighbor-relations" in irregular assemblies of molecules. He has had to find out what are the irregular arrangements of points in space that satisfy

one condition, namely that no points can be nearer than a specified distance.

His conclusion is that the basic property of a liquid, its fluidity, can be most readily understood in terms of the packing of irregular polyhedra, as in a foam.

Recent experiments have shown that at high pressures there is a perceptible interval marked by high specific heat that separates liquids from gases. Prof. Bernal interprets this as a change from a loose but coherent arrangement of molecules to an incoherent arrangement of clumps of molecules.

He contradicts the commonly accepted view that a gas and a liquid form a single fluid phase. They are distinct states of matter, although one may pass into the other without visible discontinuity.

Prof. Bernal believes this is probably a very general phenomenon applying not only to all liquids and gases, but also to all conditions of critical mixtures.

From this arises a number of considerations. For example, he predicts that although mercury is a good conductor at a certain temperature (the hypercritical point) it would lose this property and become a good insulator.

If the picture he is showing proves to be closer to reality than the more formal ones of previous workers, then there will be practical applications in the fields of refrigeration, gas-liquid separation, and the flow of liquids.

Science News Letter, December 13, 1958

ENGINEERING

Inform Engineers-To-Be

► WITH A predicted shortage in 1967 of 20,000 engineering graduates, new career guidance and information are being offered teachers and potential engineering students.

Studies of engineering aptitude suggest that certain criteria are important in estimating the probable success of a teen-ager as an engineering student. A student's potential may be considered good if he is in the top third of his group in mathematics and science courses and in standardized mathematical achievement tests, scores above 100 on IQ tests, and shows several of the following: General and technical vocabulary ability; interest in science and technology, and related hobbies; participation in science competitions; membership in science organizations; ability to comprehend scientific materials and to visualize solid objects from flat plans; friendship with scientists and technologists; good work and study habits.

A study of successful engineering students

turned up such additional characteristics as admiration for science teachers; interest in chess, puzzles and riddles; nonmember of athletic team and desire to be unlike athletes; lively curiosity and the use of the cause-and-effect approach.

These clues to engineering aptitude, as well as information about various careers in engineering, advice on high school and college course requirements and names of over 200 accredited engineering colleges, have been assembled in a Science Manpower Project monograph, "A Guide to Engineering Education" by Frank W. Eller, fellow of the Science Manpower Project, Teachers College, Columbia University, New York City.

Solid grounding in science, mathematics and liberal arts courses in high school is recommended since emphasis at the college level has shifted to include liberal arts as well as technical training.

A master's degree is usually necessary

now for positions in research and development, according to Mr. Eller, with industrial and nuclear engineering specialties often requiring on-the-job training in addition.

It is pointed out that trained engineering technicians also are much in demand to implement the work plans of professional engineers. Prospective technicians may get their training on the job, or in courses given by industries, the Armed Forces, some junior colleges and technical institutes. Aptitude for technology is much the same as that for engineering, except that superior scholarship is not as necessary.

The Science Manpower Project monograph, first of a series directed toward improving science education, has been released by Teachers College of Columbia University. The Project is supported by a group of leading industries and industrial foundations.

Science News Letter, December 13, 1958

● RADIO

Saturday, Dec. 20, 1958, 1:35-1:50 p.m. EST
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Mr. Davis will review the year's major science events.

MEDICINE

"Psychogenic" Fever In University Hospital

► A MYSTERIOUS small rise in temperature in patients with no discernible reason for fever has been found in 27.2% of patients in a university hospital.

This fever, which they call "psychogenic fever," is reported by Drs. Kerr L. White and Walter N. Long Jr. of the North Carolina Memorial Hospital of the University of North Carolina in the *Journal of Chronic Diseases* (Nov.). After a day or two in Memorial Hospital, they found, the patients' temperatures spontaneously drop down to normal.

The psychiatry service of the hospital has a higher than average proportion (29.9%) of patients with psychogenic fever, and on Medicine the incidence was even greater, 31.7%. The incidence on the obstetrics service was 0.0% but that was because labor itself is considered a cause of fever and so there were only two patients without "discernible reasons for fever."

This finding of psychogenic fever confirms an earlier report quoted by these investigators. It was found that the average temperatures of three psychoneurotic patients engaged in an exciting card game rose 1.5 degrees Fahrenheit during the first hour of the game. When the same game was repeated with all elements of gambling removed, no significant rise in temperature occurred.

Psychogenic fever has also been observed in men being examined for the draft; 67% of a group of 324 had temperatures above 99 degrees.

Science News Letter, December 13, 1958

CARDIOLOGY

Multiple Births Predicted 16th Week of Pregnancy

► **MULTIPLE BIRTHS** may be predicted as early as the 16th week of pregnancy through improved techniques of recording heartbeats of the unborn.

This is reported by Dr. Saul David Larks, biophysicist at the University of California at Los Angeles Medical School, and Dr. Kanakabeena Das Gupta, visiting obstetrician from India, in the *American Heart Journal*. The study is being supported by the U. S. Public Health Service.

They have been able to record fetal heartbeats as early as the 11th week of pregnancy, those of twins at 16 weeks and of triplets and quadruplets relatively early in pregnancy.

This technique may prove a safer and more practical method of detecting multiple births early than use of X-rays, they believe.

Characteristic spikes of the electrocardiogram seem to reflect the way the baby will be presented at birth. When spikes are up, a head presentation is indicated. Spikes down indicate breech presentation.

Fetal distress detected by the technique may be an aid to clinicians and help to minimize certain difficulties in labor, they say.

The studies are generally helping to fill in missing chapters in the history of early pregnancy, before one can hear or feel anything, Dr. Lark says. He believes he will be able to demonstrate a heartbeat as early as four to six weeks.

Science News Letter, December 13, 1958

MEDICINE

Arsenic in Tobacco May Cause Lung Cancer

► **ONE OF** the deadliest poisons known to man may soon be under fire as the cause of lung cancer among cigarette smokers.

Some scientists believe that arsenic, contained in insecticides sprayed on tobacco plants, may be doing the damage.

A group of Texas scientists report in *Cancer* that arsenic is the only component of cigarette smoke definitely known to cause cancer in man, yet little scientific and medical attention has been directed to its presence.

They found concentrations of arsenic in cigarettes as high as 17 times the maximum concentration allowed in foods by the Food and Drug Administration. Cigarettes are not regarded as a food or drug and are not regulated for arsenic content.

The report was made by Drs. Robert H. Holland, Russell H. Wilson, Dale A. Clark and Henry C. Lanz, and Antonio R. Acevedo and Mary Sue McCall. They are connected with the medical research and radioisotope units of the Veterans Administration Hospital and the surgery department of Southwestern Medical School of the University of Texas, both in Dallas. Their study was supported by the National Cancer Institute.

They found the arsenic content in cigarettes has increased between two and six times in the last 25 years.

"The coincident increase in lung cancer deaths during this period suggests a causal relationship," they said. "However, this . . . remains to be proved by further laboratory and clinical research."

Most of the arsenic, they said, is believed to come from insecticides used on the tobacco plants. In five regular-sized, unfiltered brands of cigarettes they found arsenic concentrations ranging from 42.5 to 52 parts per million. The FDA allows a maximum of three parts per million of arsenic trioxide in foods.

Of the 45 micrograms of arsenic contained in the average cigarette, nearly five micrograms is inhaled. Filters, they reported, removed about 30% of the arsenic that would otherwise be inhaled.

While they cited opposing scientific viewpoints, the Texas group believed that the habitual inhalation of arsenic, attached to irritating particles of tar, could ultimately result in lung cancer.

Science News Letter, December 13, 1958

SURGERY

Newborns Better Surgical Risks Than Older Babies

► **THE BEST TIME** to perform surgery on a newborn infant is within the first three days of its life.

The younger the infant, the less disturbing will be a major surgical procedure, Dr. H. William Clatworthy Jr. of Columbus, Ohio, explained at the clinical meeting of the American Medical Association in Minneapolis.

The infant is in excellent nutritional state with high levels of hormones and inherited antibodies circulating in the blood during the first three days of life, he said.

In addition, newborn babies are less affected by pain and require smaller amounts of anesthetic agents. They also recover rapidly.

However, after three days have elapsed from the date of birth, surgery should be suspended until the infant is two weeks old. The intervening time is a period of transition in the life of a newborn. The infant, at this time, is losing weight, and has a sluggish adrenal response.

Dr. Clatworthy noted an increased interest in children's surgery, in that one-quarter of all surgery, other than that related to maternity, tonsillectomy and adenoidectomy, is being done in children under 16 years of age.

The first three causes of death among youngsters, excluding prematurity, are congenital defects, accidents and malignant disease.

"Fortunately, for children everywhere, there appears now to be a reawakening of concern for the child and his technical surgical problems—his peculiar pathology—his physical, physiological and emotional limitations—and to prevention of unnecessary morbidity as well as mortality," the doctor concluded.

Science News Letter, December 13, 1958

IN SCIENCE

MEDICINE

Four Virus Types Cause Meningitis

► **FOUR DIFFERENT** types of a recently found group of viruses are causing the same disease, meningitis.

The culprits are numbered echo viruses four, six, nine and 16. There are at least 20 different types of identified viruses in the echo family, Dr. Tom D. Y. Chin of Kansas City, Kans., reported at the clinical meeting of the American Medical Association in Minneapolis.

These viruses can be identified; however, doctors do not yet know what diseases are caused by some of them, he said.

The four viruses that are found among persons suffering from meningitis are associated with slightly different symptoms of the disease. These symptoms include variations of combinations of stiff neck, severe headache, sore throat, nausea, vomiting, fever and general irritability, Dr. Chin said.

The highest attack rate occurs among children aged 14 or under. Approximately 25% of the persons who come in contact with victims of the viruses also become infected, but many do not have any symptoms. Many simply develop an immunity.

The echo viruses are known to cause meningitis, summer rash, particularly among children, diarrhea, acute respiratory infections and sometimes a mild paralysis.

Science News Letter, December 13, 1958

ROCKETS AND MISSILES

Army Sends 13-Lb. Moon Upward in New Probe

► **AN IMPROPER** fuel mixture may have been responsible for the failure of the U. S. Army's Pioneer III space probe, Dr. Werner von Braun, Army missile scientist, reported.

The 13-pound probe, carried in the nose of a Juno II rocket complex, was launched at 12:45 a.m. Saturday morning, Dec. 6, from Cape Canaveral, Fla. It hit a peak altitude of approximately 66,654 miles before plunging back to earth after about 38 hours of life. All four rocket stages fired, but it is thought the first stage burned out some three seconds too soon.

Intended to go past the moon and to go into orbit as a new man-made planet of the sun, Pioneer III fell short of its goal. However, it is expected to provide a great deal of information on the intensity of the radiation zone believed to extend thousands of miles into space.

This zone may be as high as 1,000 roentgens an hour some 8,000 miles out, a dose twice as high as that considered lethal to man.

Science News Letter, December 13, 1958

ICE FIELDS

AGRICULTURE

Grass-Wheat Hybrid Promises Better Wheat

► SEVERAL new wheat-grass hybrids that offer the promise of better wheat and new crops for conservation and forage are being tested.

The hybrids are also long-lived, U. S. Department of Agriculture scientists reported.

Two perennial wheat-Agrocyron selections grown at the University of California experiment station at Davis gave as good yields as the best local wheats. Although second-year yields from the hybrids, developed by USDA scientist C. A. Suneson, were much lower, scientists believe weed control and fertilization can increase the yields.

High protein flour was produced from one hybrid selection. Others have shown high disease and drought resistance.

For some 35 years, USDA scientists have been experimenting with crosses of wheat and plants belonging to the *Agropyron* genus. W. J. Sando, now retired, selected this genus of grass because of the desirable qualities he believed it would contribute to wheat.

Scientists are hopeful that undesirable qualities of the hybrids, fragile spikes, sterility, and low test weight of the grain, can be eliminated in breeding experiments.

Science News Letter, December 13, 1958

NUTRITION

Americans Starve as They Eat and Grow Fat

► MILLIONS OF Americans are growing fat and starving themselves at the same time.

Poor nutrition prevails to a disturbing degree in the United States and is generally misunderstood, ill-defined and ignored, two Evansville, Ind., physicians told colleagues at the American Medical Association's clinical meeting in Minneapolis. The doctors, Harold D. Lynch and W. D. Snively Jr., charged that everyone considers himself to be a nutrition expert.

They urged the nation's family doctors to push aside the "fads, fancies and fetishes of the laity," and tackle the problem from the standpoint of clinical medicine.

Routine examination of school children shows poor health and poor nutrition are at least as common in the prosperous school districts as in the poorer neighborhoods. Malnutrition is not necessarily depicted by the skinny, scrawny, tattered individual, a product of the slum area. Many persons simply starve their bodies of food they need while growing fat on food they do not need, the doctors pointed out.

There is an abundance of protein-containing food in the U.S. We have plentiful

supplies of fowl, meat, milk, eggs, cheese and cereals, as well as vitamins and minerals. Our children are carefully provided with minerals and vitamins while the master nutrient, protein, is neglected, Dr. Lynch said.

Children, in particular, pose a difficult problem because feeding deteriorates into a selling job as infants grow. Mothers give the child whatever they can and whenever it suits the fancy of the child.

For instance, beverages, including milk and juices, can be poured down fairly easily. But protein foods require chewing, a task which many youngsters are reluctant to perform. In addition, protein foods are not sweet. On the other hand, desserts, sweets, and palatable between-meal snacks readily win the younger child's approval. Older children and adolescents need after school and bedtime snacks that include carefully selected protein foods, the doctors concluded.

Science News Letter, December 13, 1958

EVOLUTION

Control of Evolution Now Within Man's Grasp

► CONTROL OF HUMAN evolution—if we want it—is actually within our grasp, a noted biologist predicted.

This is an example of the advances that have been made recently in human genetics, Dr. Bentley Glass of the Johns Hopkins University said. Human genetics has the difficulty of not being able to make experimental human test-crosses, he said, but the science does have its advantages.

Concerning the future, Dr. Glass said it is safe to predict that great strides will be made in experimental population control by means of tissue culture genetics. The possibility of exposing tissue culture cells carrying some defective gene to DNA (deoxyribose nucleic acid) derived from normal individuals and thus restoring the defective cells is a "spectacular" concept.

The great advances already made in the artificial synthesis of bacterial DNA suggest many fascinating possibilities of producing and modifying human genetic material in the laboratory, Dr. Glass concluded.

In certain respects, Dr. Glass told a meeting of the University of Illinois Sigma XI chapter, human genetics offers opportunities which cannot be derived from the study of plants, animals or microbes. The vast size of human populations and a large amount of medical and anthropological information have made possible unforeseen advances in the study of man and his inheritable characteristics.

However, a great deal of work needs to be done in the field of mutations before we are able to estimate accurately the danger, for example, from subjecting the entire population to fallout, medical and dental diagnostic exposures to X-rays, or possible future exposures of all kinds. From studies of fruitflies and mice, it appears that some of our conceptions of the roles recessive and dominant genes play in affecting mutations must be revised, Dr. Glass explained.

Science News Letter, December 13, 1958

BIOLOGY

Timetable Found for Protein Biosynthesis

► IT TAKES just five and one-half minutes to complete synthesis of a molecule of ferritin in the liver.

The timetable for the biosynthesis of this iron-containing protein, believed to be the first time scientists have succeeded in timing such a synthesis, was reported by Dr. Robert D. Loftfield and Miss Elizabeth Ann Eigner of Harvard University.

Working with rats that had been fed a diet low in iron prior to the experiment's start, the scientists found that because of the diet there was no significant accumulation of the ferritin molecule in the rats' livers.

Injections of a colloidal iron oxide into the venous system of rats triggered the ferritin synthesis, Dr. Loftfield reported. Later two amino acids labeled with carbon-14 were injected. The rate of uptake for the radioactive amino acids into the ferritin of the rats' livers gave the scientists their "clock" for timing the protein manufacture.

"We found," Dr. Loftfield said, "that the incorporation of the labeled amino acids into ferritin starts slowly and gradually increases so that after six minutes the rate of incorporation is equal to the rate of net synthesis."

He estimated that this rate is between 2.4% and 8.3% of new ferritin per hour under experimental conditions.

Results of these chemical time trials for the protein, which were conducted in the J. Collins Warren Laboratory at Harvard's Huntington Memorial Hospital, are significant in the study of cell metabolism. This, in turn, is related to problems of cancer with its uncontrolled cell growth.

Science News Letter, December 13, 1958

GENERAL SCIENCE

Science News Coverage Increased Since Sputnik

► U. S. NEWSPAPERS have increased their science news coverage substantially since the Russians launched the first sputnik a year ago.

Responding to an inquiry from the National Association of Science Writers and New York University, 236 newspapers provided the following information:

Ninety-four papers give science news twice as much space as they did last year. Eighty-eight are allotting 50% more space, 42 have increased coverage slightly, 11 reported no change, and none said they decreased coverage.

Asked to specify the science news they thought had special interest, 189 papers cited satellites and outer space. Next was medicine (134 papers), atomic energy (129), agricultural science (77), military science (67), aviation (63), general research (37), new inventions for the home (25), engineering (17), astronomy (13), physics and chemistry (10), social sciences (7) and biological sciences (1).

Science News Letter, December 13, 1958

GEOPHYSICS

IGY Brings Many Discoveries

The International Geophysical Year, an 18-month probe of the earth and its environment that ends Dec. 31, brings many discoveries.

By ANN EWING

► MAN'S MOST extensive look and study of the planet earth came in the past 18 months of concentrated research upon outer space, weather, oceans and the frigid ends of the earth.

Here are the top accomplishments of the International Geophysical Year (IGY):

1. Artificial satellites of the earth were put into orbit and outer space probes launched.

2. The Antarctic continent was explored extensively and the South Pole colonized for the first time. This unknown white land will never again be unpopulated.

3. International cooperation in probing the earth and its environment was achieved by 66 countries, including Russia, with plans for such world-wide efforts to continue in future years.

4. An intense band of unexpected radiation, mysterious in its origin, was found to start 250 miles in space, increasing in intensity from there on out to an unknown distance. This radiation may hinder future space travel.

5. Gravity was measured successfully with high accuracy from submarines and for the first time from surface ships, giving new information on the constitution and shape of the earth, 75% of which is covered by water.

6. The atmosphere 200 to 2,000 miles high was proved denser than was guessed before probing with satellites.

7. The sun was found to emit X-rays that cause blackouts of radio communications by generating an additional electrically ionized layer of the upper atmosphere.

8. The earth holds 40% more snow and ice than was previously believed.

Key to the IGY program was the sun, and planet earth's star cooperated beyond anyone's expectations. It hit the highest level of activity of man's recorded history.

Although IGY was planned for the period when the sun would be at a peak in its 11-year cycle of activity, no one anticipated that "Old Sol" would usher in the program with a bang, then continue its superb performance for many months.

Changes in the sun's activity during its 11-year cycle of ups and downs are known to have profound influences upon earthly events, and learning more about them was a reason for holding IGY.

Just before the program started, on June 28, 1957, the sun erupted in a major flare, shooting out a giant tongue of gas with the energy of millions of hydrogen bombs exploding simultaneously.

Illustrative of IGY's international char-

acter, the flare was first detected at the Krasnaya Pakhra Observatory in the Soviet Union and the world was notified of the event by the World Warning Agency with headquarters at Fort Belvoir, Va.

Particles ejected by the sun during the flare reached earth the night of June 30-July 1, to usher in the IGY with a spectacular aurora. Studies of other auroral displays since then indicate auroras occur simultaneously in both the Northern and Southern Hemispheres.

In a related field, the so-called electrojet, a planet-circling electrical current high in the atmosphere over the equator, was discovered and its position mapped. The equatorial electrojet, combined with similar currents circling the North and South magnetic poles, is believed responsible for changes in the earth's magnetic field.

An investigation into the intensity of cosmic ray bombardment showed that the cosmic ray equator is consistently in a different position than the geomagnetic equator. This suggests there are important magnetic fields, probably not of earthly origin, far out in space.

In the field of the earth's heat and water budget—its oceans, atmosphere and great ice masses—many important discoveries have been and will be made. One, now be-

ing investigated by several different traverses of Antarctica, may mean that the "white continent" is not a solid land mass at all or that it is two continents.

Also it has been found that the South Pole, almost 10,000 feet above sea level, has 9,000 feet of ice beneath it. Byrd Station, which sits on 10,000 feet of ice, is only 5,000 feet above sea level. The thickest ice layer known, some 14,000 feet deep, was discovered.

Because of permanent outposts at the bottom of the world, weathermen have for the first time a relatively complete picture of the weather in the Southern Hemisphere and, therefore, of earth on a planet-wide basis.

An undersea mountain range has been discovered in the Arctic Ocean. Much information about the cold waters, as well as the earth's shape, was obtained when two nuclear submarines sailed under the Arctic ice. One, the Nautilus, went from the Pacific to the Atlantic underwater by way of the North Pole.

In studying the three-quarters of the earth covered by water, oceanographers discovered a counter-current under the Gulf Stream off the east coast of the U. S.

Another counter-current, called the equatorial undercurrent, was found flowing from Asia toward Panama in the equatorial region. It carries about a billion cubic feet per second, about 1,000 times the Mississippi River's transport.

Meteorologists, oceanographers and glaci-



GLACIOLOGISTS STUDY ANTARCTICA—An example of one of the thousands of research projects being conducted under the International Geophysical Year program, these two glaciologists are studying the ice-written history of Antarctica. At each scientific station on a 1,000-mile traverse of the unknown continent, scientists dug a pit nearly ten feet deep to study the temperature, density, layering and crystalline structure of the snow.

ologists are learning to explain the relationships of the cold and warmth of the water, ice and vapor around the earth.

In the earth's crust and interior, programs of unprecedented scope are being pursued. Besides the new gravimeter, special long-period seismographs are detecting earthquakes around the world.

Scientists of 29 countries at 45 IGY stations are determining more accurately the latitudes and longitudes. At some stations, very precise moon position cameras are being used to locate the earth's land mass more precisely than previously possible.

The satellites launched during IGY are scientific instruments that tie together all the rest of the program. In a more time-limited way, so also do the hundreds of rockets hurled aloft from pole to pole during the past 18 months.

Satellites have helped to determine air density and temperatures hundreds of miles in space, the variation in and structure of the radio-reflecting ionosphere. Future ones should tell about differences in the earth's gravitation, map the primary cosmic ray occurrences and the earth's magnetic field.

IGY's most important discovery, however, may well be the unequalled cooperation of scientists from all nations of the world. So successful has the venture been that a new program of further research in geophysics and related sciences will begin Jan. 1, 1959. It will be called International Geophysical Cooperation, 1959.

Cooperation 1959

Geophysicists are also making plans for continued international cooperation after 1959. Three joint groups, known as CO-SPAR, SCAR and SCOR, will operate in the fields of space, Antarctic exploration and oceanography under the same international organization that conducted the IGY.

This is the International Council of Scientific Unions, and is the principal agency by which the world's scientists coordinate their activities. Its members are drawn from 13 international unions covering fields from astronomy to physics.

One important aspect of IGY, still in the future although the program closes Dec. 31, is the analytical and theoretical research to be done with the information accumulating at the World Data Centers.

Dr. Joseph Kaplan, University of California physicist who is chairman of the U. S. National Committee for the IGY, said research on these data had two aspects, normal and special.

The normal research is that which hundreds of thousands of scientists will do using various portions of the data in a broad variety of studies.

However, to capitalize fully and promptly on the IGY, Dr. Kaplan urged a special and major effort to last about two years and be inter-disciplinary in nature. That is, it would be a concentrated directed attack upon several interrelated fields at once.

This program is called for because of the astonishing discoveries already made, such as the mysterious radiation band surrounding earth. Other new discoveries are bound to come, and U. S. scientists should act promptly to take advantage of the unique opportunity presented by IGY data.

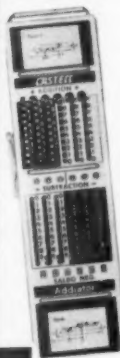
Science News Letter, December 13, 1958

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On the Front

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On the Back

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

APPLICATIONS OF SKID-RESISTANT SURFACES TO HIGHWAYS—Alvin L. Ruefer and others—*Highway Res. Bd.*, 18 p., illus., paper, 50 cents. Discusses silica sand resurfacing and application of resinous skid-resistant surfaces.

THE ARMADILLO—Theodore W. Munch and M. Vere DeVault—*Steck*, 30 p., illus. by Carol Rogers, \$1.50. Beautifully illustrated, easy-to-read book for young readers.

AXIAL FLOW COMPRESSORS: Fluid Mechanics and Thermodynamics—J. H. Horlock—*Butterworth (Canada)*, 189 p., illus., \$8. Basic information for the engineer.

CATALYSIS, VOL. VI: Alkylation, Isomerization, Polymerization, Cracking and Hydroreforming—Paul H. Emmett, ed.—*Reinhold*, 706 p., illus., \$19.50. Comprehensive treatment of hydrocarbon catalysis and catalytic processing.

CHART OF RADIOISOTOPE APPLICATIONS—Howard F. Gunlock—*Nuclear-Chicago*, 23 x 36 inches, paper, \$1, science teachers free upon request to publisher, 223 West Erie St., Chicago 10, Ill. Charts effects of radioisotope radiations on materials, effects of materials on radioisotopes, and tracing materials with radioisotope radiations.

THE CHEMICAL PREVENTION OF CARDIAC NECROSES—Hans Selye—*Ronald*, 235 p., illus., \$7.50. Monograph coordinates data of isolated observations on cardiac necroses in the light of newly acquired knowledge about the electrolyte-steroid-cardiopathies.

FREE RADICALS: As Studied by Electron Spin Resonance—D. J. E. Ingram—*Academic*, 274 p., illus., \$9.50. Introductory text explains basic theory, experimental methods, advantages and limitations of the technique and summarizes relevant published work.

FRUITS FOR SOUTHERN FLORIDA—David Sturrock—*Southwestern Printing Co.*, 196 p., illus., \$4. Describes 120 fruiting trees and bushes, sorted into groups according to susceptibility to cold.

GAS TUBES—Alexander Schure, Ed.—*Rider*, 72 p., illus., \$1.50. Includes chapter on thyra-trons.

IRAQ: Its People, Its Society, Its Culture—George L. Harris and others—*HRAF Press*, 350 p., maps, \$7. Third volume in the Survey of World Cultures series, prepared by the Human Relations Area Files, a non-profit research organization affiliated with Yale University.

LIQUIDS AND GASES—Alexander Efron—*Rider*, 117 p., illus., paper, \$2.10. For high school physics students.

THE LOST WORLD OF THE KALAHARI—Laurens van der Post—*Morrow*, 279 p., \$4. Account of search for the last remaining Bushmen.

METALLIC RECTIFIERS AND CRYSTAL DIODES—Theodore Conti—*Rider*, 164 p., illus., paper, \$2.95. Of interest to engineers, students of electronics and radio amateurs.

PARENTAL AUTHORITY: The Community and the Law—Julius Cohen, Reginald A. H. Robson and Alan Bates—*Rutgers University Press*, 301 p., \$6. Of interest to lawyers and sociologists.

PAVEMENT PERFORMANCE: Methods for Evaluation—F. N. Hveem and others—*Highway Res. Bd.*, 77 p., illus., paper, \$1.60. Discussion of causes of failures in highway pavements.

PHYSIOLOGY OF FUNGI—Vincent W. Cochrane—*Wiley*, 524 p., \$9.75. A comparative approach, applying modern concepts of biochemistry to fundamental physiological problems of fungi. Bibliographies.

POLYSACCHARIDES IN BIOLOGY—Georg F. Springer, Ed.—*Macy*, 249 p., \$4.75. Transactions of the Third Conference, May 1957.

Princeton, N. J., discussing homopolysaccharides, nucleotides and saccharide synthesis.

PSORIASIS—Peter Fleisch, Ed.—*N. Y. Acad. of Sciences, Annals*, Vol. 73, Art. 5, 124 p., illus., paper, \$2.75. Monograph is result of conference held by The New York Academy of Sciences on May 9, 1958.

THE STORY OF ALEPH BETH—D. Düring—*Philosophical Lib.*, 195 p., illus., \$4.75. Introduction to the history of the Hebrew alphabet.

THE STUDY OF THE PHYSICAL WORLD—Nicholas D. Cheronis, James B. Parsons and Conrad E. Ronneberg—*Houghton*, 3rd ed., 684 p., illus., \$7.50. Revision treats fewer topics more intensively, provides course for a full year.

UMBELLIFERAE OF JAPAN—Minosuke Hiroe and Lincoln Constance—*University of California Press*, 144 p., illus., paper, \$2.75. To permit intercontinental comparison, study emphasizes similarity rather than dissimilarity to comparable taxa in North American flora.

THE USE OF PSYCHOTHERAPY IN DIVORCE AND SEPARATION CASES—John H. Mariano—*Am. Press*, 179 p., \$3. Author thinks that separating couples are more often in need of psychiatric treatment than of divorce.

V-2: The Nazi Rocket Weapon—Walter Dornberger, introd. by Willy Ley—*Ballantine Books*, paper, 50 cents. The German General's story of Hitler's "secret weapon."

VACUUM METALLURGY—Routan F. Bunshah, Ed.—*Reinhold*, 472 p., illus., \$12.50. Up-to-date reference work for engineers and research workers.

VISUALIZED CHEMISTRY—William Lemkin—*Oxford Bk Co.*, rev. ed., 364 p., illus., \$1.50. Includes college entrance achievement test.

VITAMINS AND HORMONES: Advances in Research and Applications, Vol. XVI—Robert S. Harris, G. F. Marrian and Kenneth V. Thimann—*Academic*, 437 p., \$11.60. Nine articles, bibliographies.

WALT DISNEY'S WILDLIFE OF THE WEST: Animals of the Plains, Mountains and Deserts—Robert Louvain and Staff of Walt Disney Studio—*Simon & Schuster*, 56 p., illus., 50 cents.

Science News Letter, December 13, 1958

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ENGINEERING

Rotating Parachute Resembles Helicopter

See Front Cover

► A NEW PARACHUTE, equipped with four cloth blades that spin like a helicopter's rotor, could take much of the danger out of jumping.

Known as the Vortex Ring parachute, it is intended for use in military paratroop and cargo air drop operations, in missile recovery and for braking of high-speed aircraft.

Designed by David T. Barish, a New York engineering consultant, it will be produced by Pioneer Parachute Company, a subsidiary of Reliance Manufacturing Company. The design is said to mark the first major change in parachutes in 50 years.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the parachute being used as a ground brake to slow down aircraft after it has landed.

Tests, which are still being conducted by the military services and two jet aircraft manufacturers, indicate that the shock effect on opening is greatly reduced because less material is exposed to wind blast, and that there is almost no oscillation or glide. This latter characteristic makes it possible to drop personnel or cargo vertically without a pendulum swinging effect. This, in turn, improves target-hitting accuracy.

The Vortex Ring 'chute has less bulk and weight than an equivalent conventional parachute, and, when packed, can fit into a standard brief case. A standard 32-foot size weighs eight pounds with swivel.

The rate of descent of the parachute is about the same as that of conventional ones, although the new design utilizes 60% less cloth area. Ground injuries with the parachute are minimized because it collapses on the ground more readily than former parachutes.

Rotation of the four cloth blades creates a vortex ring of air around the tips, increasing drag area and, in effect, enlarging the parachute's size. The rate of spin is one revolution every two seconds. The corners of the blades are attached to nylon suspension lines drawn together at a swivel below the 'chute. The swivel has a point of attachment for cargo, personnel, missiles or aircraft.

Science News Letter, December 13, 1958

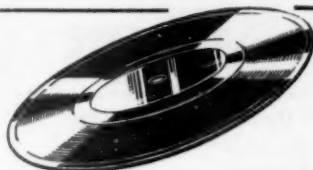
Questions

ASTRONOMY—How could the "leaky bucket" theory explain the existence of auroral lights? p. 371.

BIOLOGY—How long does ferritin synthesis take? p. 377.

PHYSICS—What are two problems involved in supporting the theory that organized irregularity is the key to the structure of liquids? p. 375.

Photographs: Cover, Pioneer Parachute Company; p. 371, State University of Iowa; p. 375, American-Swedish News Exchange; p. 378, International Geophysical Year; p. 384, Edwin Jay Inc.



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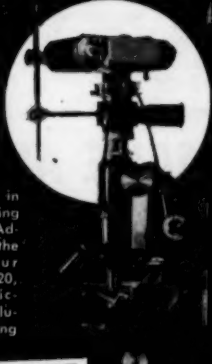
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Christmas Stocking Science

(Continued from page 374)

has prepared a great variety of helpful material, single copies free: Directions and diagram for a homemade Geiger counter; information on laboratory experiments with radioisotopes (no AEC license necessary) and with a continuous cloud chamber; and publications on power reactors, biological problems and peaceful uses of atomic energy.

Atomic Research Laboratory, 10717 Venice Blvd., Los Angeles 34, Calif., has a 75¢ booklet on laboratory experiments with radioisotopes and free leaflets on radiation safety in schools and a price list of radioactive isotopes.

Kits for physics experiments, a cloud chamber, an electromagnet, etc., can be purchased from Atomic Laboratories, 3086 Claremont Ave., Berkeley, Calif., at prices ranging from \$15 up.

For Electronics Enthusiasts: Various kits, such as a microphonic kit (about \$10), a crystal radio kit (about \$8), a tool set including a soldering iron (about \$10), other kits from \$5 up are available from the Heath Co., Benton Harbor, Mich.

Helpful background includes "Radio Builder's Handbook" (25¢), "Coil Winding Calculator" (50¢), "Parallel-Resistance and Series-Capacitance Calculators" (35¢) and others from Allied Radio Corp., 102 N. Western Ave., Chicago 80, Ill.

Bugs and Radio Tubes

Radio Corporation of America, Electron Tube Division, Harrison, N. J., has tube manuals for 75¢ and \$1, a book on transistors and semi-conductor diodes for 25¢.

For Star Gazers: A manual for observing variable stars is supplied for \$1 by The American Association of Variable Star Observers, 4 Brattle St., Cambridge, Mass.

Rand McNally and Co., Box 7600, Chicago 80, Ill., has issued a colorful wall map of the moon with a map of the planets, drawings of rockets and satellites, and detailed information on the reverse side, \$1.

A gyroscope (in stores \$1 up) makes a good stocking-stuffer, especially if you include "The Gyroscope Through the Ages" (free) issued by Sperry Gyroscope Co., Marcus Ave., Great Neck, L. I., N. Y.

Beginner's Set, mounting biological specimens in plastic; Aquarium Assortment; Prepared Microscope Slide Set, Carolina Biological Supply, Elon College, N. C.

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Guides, list of 55 nature bulletins at 15¢ each, Nature Charts, 25¢ each, National Audubon Society, 1130 Fifth Ave., New York 28, N. Y.

Illustrated Science Catalogue (price 50¢), insect nets, pins, boxes, plant presses, aquaria, live specimens, glassware, chemicals, etc., New York Scientific Supply Co., 28 W. 39th St., New York 1, N. Y.

Nature Guide Catalogue, materials for mineral, fossil, insect collectors, other science hobbies, Ward's Natural Science Establishment, Box 1712, Rochester 3, N. Y.

Science News Letter, December 13, 1958

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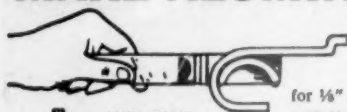
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This 3/4 ton capacity Power-Pull weighs only 6 1/2 lbs. and is precision built of certified materials. Designed for ease of one-man operation and tested to full 50% overload. All steel frame parts are aluminum plated with stress marks made of high tensile manganese bronze. Aluminum alloy ratchet wheel is protected by cable guard. Preformed aircraft cable, 3/16" in diameter, winds on drum positioned to be clear at all times. Automatic let-down feature enables operator to release loads one notch at a time, permitting faster operation in complete safety. Minimum diameter between hooks is 21", maximum lift is 6 ft. leverage is 18:1. American Hoist-Puller is indispensable for Sheds, Garages, Farms, Construction and Maintenance—anywhere lifting, stretching or pulling is required.

6 ft. lift—\$22.95

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Cover Outdoor Equipment—Dust, Moisture—



Proof Protection!

WATERPROOF, RESISTANT
TO DUST, AIR, GREASE.
UNAFECTED BY
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Protects from dust, dirt, moisture, rust, moth, heat, cold, etc. Transparent! Stains wipe off! Lightweight, strong, inexpensive!

For HOME—Cover auto seats, furniture, mattresses, lamps, rugs, appliances, luggage, silver to prevent tarnish, air conditioners. Use as shower curtains, storm windows. Keep paint off furniture, floors, etc. Wrap food, mothproof wrap clothes.

For OUTDOORS—Cover boats, sports and fishing equipment, tennis courts, cars. Make children's play tents.

For GARDENS—Protect outdoor furniture and equipment, shrubs, plants, newly seeded lawns. Build greenhouses. Cover lawn mowers.

For INDUSTRY—Cover equipment and machinery. Fumigation, oxygen tanks. Painter's drop cloth. Floor covers for car trunks, trucks. Chases moisture vapor from crawl spaces, etc. Curing concrete. Keep rain away from outdoor work areas.

36" x 100 ft.—.004 gauge—\$ 6.95

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EXTRA SPECIAL!

50" x 200 ft.—.002 gauge—\$ 9.95

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Add 50¢ to all prices for pp. & hdg.

RAY-O-VAC

SEE-A-MILE RANGE FLASHLIGHT

Beautifully designed flashlight 17" long, 6 cell flashlight. Guaranteed to brilliantly light up even the smallest object a FULL MILE AWAY! If you don't need the full power of 6 cells, merely unscrew the barrel at mid-mark and presto, you have a handy 3 cell flash. This rugged, heavily chrome plated flash has a knurled finish barrel for secure gripping; a full 3" aluminum reflector with special PR 18 bulb; footpedal 3-position switch plus removable end cap with ring hanger.

Free Spare PR 18 bulb \$4.95
with each flash p.p.d.

RAY-O-VAC

SPORTSMAN CAMPER'S LIGHT

The perfect portable light for Fishing, Boating, Camping, Farm, Car, Cabin, Picnic, Hospitals, Schools! Forests! The brightening hazard of fire caused by antiquated, smelly, kerosene lamps, coal oil or kerosene lamps. The Sportsman is Safe—convenient to carry—gives you all the light you'll ever need! Heavily chromed steel head securely fastens to colorful, powerful, long-life Sportsman lantern. Swivel head of the lantern is adjustable to 360 degrees—casts a bright, piercing beam for use as a spot-light.

Complete with battery \$8.95 p.p.d.

RAY-O-VAC SPORTSMAN LANTERN

with Red Signal Flasher



For all outdoor—hunting, fishing, hiking—ideal for farm, home, car for emergencies. Features powerful sealed beam spotlight with SHOCK ABSORBER mounted in 180 degree adjustable head. Head of lantern has a shatterproof red flasher which operates in all positions. Dual switches are conveniently located on knurled, sure-grip. Entire unit is heavy glass body. Flasher is chrome plated steel guaranteed to resist corrosion and rust. Lantern platform completely covers edges of battery for added protection.

Complete with 6 Volt Battery \$12.40 p.p.d.

"Hoppy" Split-Image Transits Revolutionary LEVEL & INCLINE MEASURE

IDEAL FOR:

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2.9 AMP HEAVY DUTY

1/4" RAM DRILL

with Jacobs Geared Chuck

& Key

Reg. \$39.95—Our Price



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Flexible Steel

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Every Direction



Made of super quality silicon steel, the exclusive interwoven blades cut quickly, easily yet never clog. Ideal for hobbyists, scouts, outdoor gardeners, farmers, campers, etc. to cut wood, formica, rubber, metal, plastics, ice, nonferrous metals and most anything else... in any direction! Cutting teeth guaranteed not to wear. Rust resistant. Easily rolls up for carrying in plastic pocket case. Weighs less than a pack of cigarettes. Imported from France; used by French Military and British Commandos.

SPORTSMAN—20"—.063 dia.— 98¢ p.p.d.

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COMMANDO—35"—.095 dia.—\$1.98 p.p.d.

20 CAMEL HAIR BRUSHES

Quality Close-Out—Only 5¢ each

Precision crafted in West Germany. Perfect for artists, touching up around house, cleaning electrical and optical instruments and guns. Sizes range from fine #1 to full #25. Select camel hair firmly set in metal grip to give years of use. Worth many dollars, but ALL 20 yours for only

\$1.00 p.p.d.



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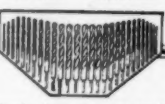
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Pliers 75¢ Ea.

Flat Nose, Round Nose, Diagonal, End Cutting Nippers, 1 Side Flat—1 Side Round, Snipe Combination for Jewelers, Optical Workers, Hobbyists. These European instruments are of deep-forged, heat-treated high quality tool steel, fabricated to most exacting specifications. All-over ground, polished to smooth hard surfaces. Smooth working joints with right tension. Jaws meet perfectly to securely hold the most delicate objects in hard-to-reach corners and angles. Each plier is 4" long.

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Chrome Vanadium 29 Pc. DRILL SET



Specially made for speed drilling. In sturdy plastic tool roll. Finest alloy steel drills hardened and precision ground to the sharpest, longest lasting cutting edge obtainable; will easily and clearly bite through hardwoods, plastics, aluminum, iron and toughest steels. Unconditionally guaranteed for thousands of drillings. Full jobber length. Sizes by 64th from 1/16" to 5/8". There are only a limited quantity of sets available at this low price, so hurry!

Also available with Turned Down Shanks to fit all 1/4" drills. In individual pocket roll.

\$6.49 p.p.d.

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JIFFY UTILITY CABINETS

Stop losing or misplacing small items... keep them handy, visible, clean and safe in Jiffy Cabinets. Serves as handy storage for small things in kitchen, workshop, office, den, garage, sewing or hobby room. Drawers 3 1/2" x 2 1/2" x 1 1/2" are made of crystal clear styrene plastic with deep-in dividers to make 3 compartments plus index labels to fit slots in drawer fronts. Stopper back permits drawer to hang open without spilling. Dust-proof, partitioned, welded solid metal frame, rubber feet, frame punched for easy hanging. In red or grey.

16 Drawer Unit.....\$ 6.00 p.p.d.
24 Drawer Unit..... 8.00 p.p.d.
32 Drawer Unit..... 11.00 p.p.d.
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For Shop, Inspection Bench, Machine Tool, Laboratories

Swivels and angles in any conceivable direction. Guaranteed to hold your light exactly where you want it because 3 arms—3, 12" and 1—10" adjust on 3 ball joints. Easy to mount anywhere. Takes up to 100-watt bulb. Has 8-foot long-wearing neoprene cord and heavy glass shatterproof red flasher which operates in all positions. Entire unit is heavy glass body. Flasher is chrome plated steel guaranteed to resist corrosion and rust. Lantern platform completely covers edges of battery for added protection.

\$4.95

plus 50¢ pp. & hdg.

Now! Shut Out Cold, Wind, Water, Snow... Keep Garage Warm and Dry ALL WINTER with... FLEXIBLE RUBBER GARAGE DOOR BOTTOM



Don't waste preloans heating dollars! Keep winter cold, snow, rain, dust and drafts out—keep heat in with this amazing heavy-duty, live rubber weather-stripping. Ingenious front and back lip contour design makes it an automatically perfect closure regardless of shape of floor. Guaranteed never harder to use or deteriorate in any fashion. Eliminates forever ear-shattering noises no matter how hard you slam down your overhead garage door. Ideal also for sides of double hung garage doors, barn doors, etc. Can be permanently applied in only 10 minutes—requiring just a hammer—we supply the nails. Complete, simple instructions in plastic bag. 9 foot strip—\$2.99 p.p.d., 16 foot strip—\$4.98 p.p.d.

60 Pc. Set Wire Gauge CHROME VANADIUM DRILLS



Top quality high test Chrome Vanadium Drills designed for speed drilling through toughest steels, woods, plastic, iron and aluminum. Precision ground, long-lasting cutting edges.

Guaranteed to give years of satisfaction. A full 60 pc. set, Nos. 1 through 60. A \$14.95 value NOW ONLY \$5.40 p.p.d. & hdg. Name set above without \$6.65 p.p.d. & hdg. Index Container—Only—\$2.50 p.p.d. & hdg. Also available \$1.80 set of high quality drill in plastic kit with marked pocket for each drill—ONLY \$2.50 plus 35¢ pp. & hdg.

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• **TOY TRAIN STREAMER** to be strung across roof or marquee has Santa Claus at controls of candy-striped locomotive. Engine is of weather-resistant plastic, 56 inches long by 39 inches high. Two passenger cars, a box car and a caboose, in proportionate sizes, complete the train. The entire plastic unit weighs about 60 pounds and spans from 25 to 35 feet, depending on spacing.

Science News Letter, December 13, 1958

• **CONSOLE TYPEWRITER TABLE** can be converted into a desk or end table. Out of sight when not in use, the built-in typewriter is rolled forward and locked into typing position in one motion. The table is constructed of walnut, mahogany or blonde oak.

Science News Letter, December 13, 1958

• **ICE BUCKET LINERS** of polyethylene provide easy-to-clean surfaces and help bucket keep ice cubes up to 24 hours. They cannot break under impact or when subjected to freezing temperatures and are said to be superior to coated metal in that they will not rust or oxidize.

Science News Letter, December 13, 1958

• **DRINK POURER SET** consists of hand-painted pouring heads with lifelike features made to resemble a pirate, a Tyrolean, a



clown and a sailor. The heads, two of which are shown in the photograph, are of odorless, tasteless, acid-proof plastic and fit all size bottles. By squeezing the head a jiggerful of liquid is dispensed without spilling or dripping.

Science News Letter, December 13, 1958

• **MAGNETIC TV THEATER** enables the children to produce their own shows. It comes equipped with 16 magnetic characters, two backdrops, 12 scenery pieces, and

three complete scripts—*The Three Bears*, *Sleeping Beauty* and *Little Red Riding Hood*.

Science News Letter, December 13, 1958

• **PORTABLE PLAYHOUSE** for the youngsters slips over any standard card table. Made of washable cotton and stenciled with decorations, it has a real tinkling door bell and a wooden tent pole to make a realistic peak in the roof. Simply constructed, the playhouse is easily dismantled and folds compactly for storage.

Science News Letter, December 13, 1958

• **FIVE-ANGLE FLASHLIGHT** has a case of impact-resistant butyrate plastic, designed with flat sides that offer a choice of stationary bases from which the light can be beamed at five different angles. The light is available in yellow, red, blue or ivory cases, uses ordinary flashlight batteries, and shoots a beam up to 1,000 feet.

Science News Letter, December 13, 1958

• **TALCUM POWDER CONTAINER**, topped with brush head of long, soft nylon filaments, makes mother's baby-powdering chores easier. The talcum shakes out through the perforated cap, which is part of the brush. The cap is removable, may be washed and will dry quickly.

Science News Letter, December 13, 1958



Nature Ramblings



By HORACE LOFTIN

► TWAS TWO nights before Christmas when Mr. America went down to the store to pick out his Christmas tree. He stalked around the pile of trees, spotted a big, full-foliaged fir, pointed to it and said "I'll take that one!"

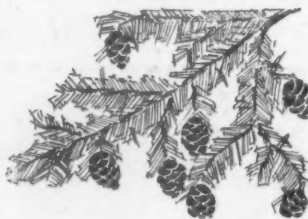
When he got it home, Mrs. America told him to put it in the basement, where the furnace was sending out its warmth. On Christmas Eve, Mr. and Mrs. brought the tree to its place by the family fireside.

Alas, the tree was not the same bright green, full-foliaged tree that Mr. America had bought. It had a brownish look about it, and needles rained onto Mrs. America's rug at the least touch. Holes in the foliage revealed the naked branches.

This story would have had a happier ending if it had started like this:

'Twas a week or earlier before Christmas when Mr. America went down to the store to pick out his Christmas tree. He knew trees that stay a long time in the store are

Christmas Tree Care



likely to be in poor condition. He meant to care for this one himself.

After selecting a tree for its shape and size, he ran his hand over the foliage. It felt moist; if it had felt dry, he would have passed the tree by. As a final test, he lifted the tree and brought the butt down sharply against the floor. Few needles fell, and he was quite certain then that the tree was in good condition.

When he got it home, Mrs. America told him to put the tree outside in a shady spot,

preferably on the north side of the house. This he did, after sawing about one inch off the butt. He set the tree in a bucket of water, too. From time to time Mrs. America checked the water level, keeping it full. In the first day or two, the tree may use a quart of water.

On Christmas Eve, Mr. and Mrs. brought it to its place across the room from the family fireside, if anything a handsomer tree than when they bought it!

There is more to this story, for the Christmas tree needs care when it is in use. A second inch should be sawed from the butt and the tree set up in the house in a container of water. Wet earth can be used, but water is best. The tree should be kept away from fireplaces, radiators and television sets (since TV sets generate heat). It is advisable to inspect the tree lights, making sure there are no frayed wires.

If you follow these suggestions, you should have the finest tree under which you ever put a present.

Science News Letter, December 13, 1958

